

0.1 Ssd : intrinsic resolution

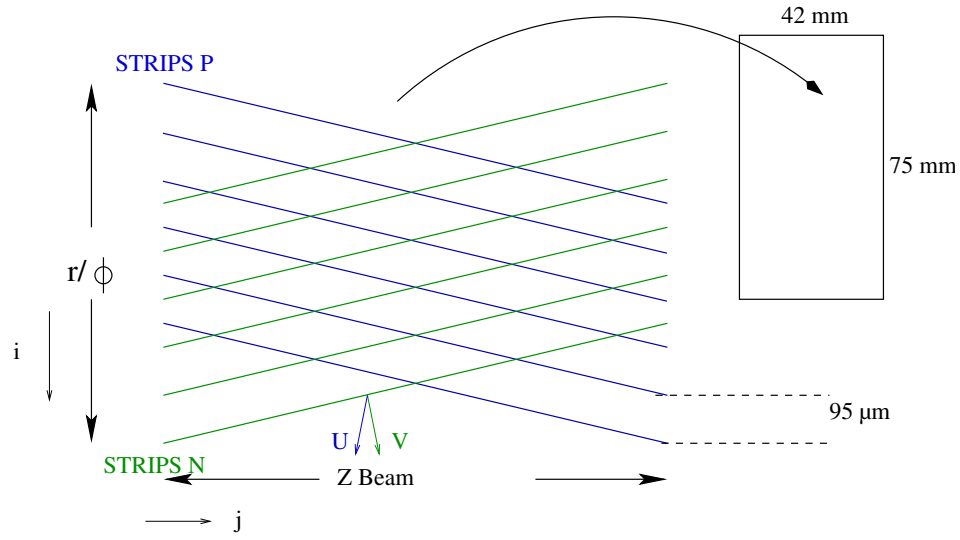


FIG. 1 – Orientation of Strips P and N in a wafer

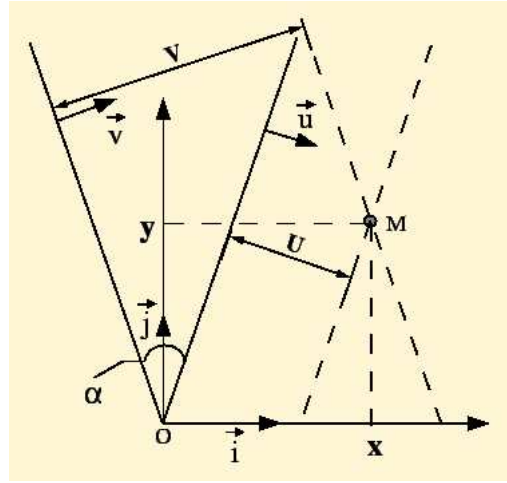


FIG. 2 – Relation between the local frame to the wafer (strips) and global coordinates : $r\phi$ and Z

(\vec{U}, \vec{V}) are in the strips frame whereas (\vec{i}, \vec{j}) are in the global frame with \vec{i} along $r\phi$ and \vec{j} along Z.

α is the stereo angle between strips of P-side and strips of N-side and its value is $\alpha = 35$ mrad.

$$\begin{cases} \vec{U} = \cos\frac{\alpha}{2}\vec{i} - \sin\frac{\alpha}{2}\vec{j} \\ \vec{V} = \cos\frac{\alpha}{2}\vec{i} + \sin\frac{\alpha}{2}\vec{j} \end{cases}$$

Then in the global coordinates, we get :

$$\begin{cases} r\phi = \frac{\vec{U} + \vec{V}}{2\cos\frac{\alpha}{2}} \\ Z = \frac{\vec{U} - \vec{V}}{2\sin\frac{\alpha}{2}} \end{cases}$$

For the resolution in $r\phi$ and Z , and by using the errors propagation :

$$\begin{cases} \sigma_{r\phi} = \frac{\sigma_U \oplus \sigma_V}{2\cos\frac{\alpha}{2}} \\ \sigma_Z = \frac{\sigma_U \oplus \sigma_V}{2\sin\frac{\alpha}{2}} \end{cases}$$

$$\begin{cases} \sigma_{r\phi} = \frac{\sigma_U}{\sqrt{2}\cos\frac{\alpha}{2}} (a) \\ \sigma_Z = \frac{\sigma_U}{\sqrt{2}\sin\frac{\alpha}{2}} (b) \end{cases}$$

As the strip pitch is $95\mu\text{m}$:

$$\sigma_U \simeq \frac{95}{\sqrt{12}} \simeq 27\mu\text{m} \quad (1)$$

so when we report σ_U in (a) and (b), we have :

$$\begin{cases} \sigma_{r\phi} \simeq 20\mu\text{m} \\ \sigma_Z \simeq 1000\mu\text{m} \end{cases}$$

But people were not using $\sigma_U = 27\mu\text{m}$ but results from beam test which gave $\sigma_U \simeq 21\mu\text{m}$.